

Claims

What is claimed is:

1. A system for applying a material onto a photoresist material layer disposed on a substrate, the system comprising:

a parallel plate having a generally planar surface that has a shape adapted to substantially surround the top surface of the photoresist material layer disposed on the substrate, the general planar surface having a plurality of apertures extending therethrough, the parallel plate being adapted to receive the material and apply the material onto the photoresist material layer through the plurality of apertures wherein the parallel plate is positioned above the photoresist material layer during application of the material forming a gap therebetween; and

a voltage source operable to provide a differential voltage, the voltage source having a first terminal coupled to the parallel plate and a second terminal coupled to the substrate wherein a differential voltage is applied to the parallel plate and substrate providing an electric field in the gap.

2. The system of claim 1, wherein the material comprises a developer material.

3. The system of claim 1, wherein the material comprises a washing solution.

4. The system of claim 1, wherein the gap having a size from about 0.5 to about 5 mm.

5. The system of claim 1, wherein the parallel plate having the generally planar surface has a shape adapted to completely surround the top surface of the photoresist material layer.

6. The system of claim 1, further comprising a developer supply system, wherein the developer supply system further comprising at least one developer supply nozzle coupled to the parallel plate, the developer supply nozzle being adapted to supply the parallel plate with the material.

7. The system of claim 1, further comprising a rotating shaft coupled to the parallel plate, the rotating shaft being adapted to rotate the parallel plate during application of the material.

8. The system of claim 7, wherein the rotating shaft having a material supply tube extending therethrough, the material supply tube being adapted to supply the parallel plate with the material.

9. The system of claim 1, wherein the general planar surface having a generally circular shape with a circumference approximately equal to a circumference of the substrate.

10. The system of claim 1, wherein the differential voltage causes the photoresist material layer to retain a negative charge and the negatively charged photoresist material layer facilitates transport of developed portions of the photoresist material layer during a development process upon being exposed to the electric field in the gap.

11. A method for applying a material onto a photoresist material layer disposed on a substrate, the method comprising the steps of:

providing a parallel plate having a generally planar surface that has a shape adapted to substantially surround the top surface of the photoresist material layer disposed on the substrate, the general planar surface having a plurality of apertures extending therethrough for applying a material onto the photoresist material layer; positioning the parallel plate above the photoresist material layer forming a gap therebetween;

applying a differential voltage between the parallel plate and the photoresist material layer providing a electric field between the gap;

supplying the parallel plate with the material;

rotating the photoresist material disposed on the substrate and the parallel plate concurrently; and

applying the material onto the photoresist material layer through the apertures until the photoresist material layer is covered by the material and until the developer develops the photoresist material layer.

12. The method of claim 11, wherein the material comprises a developer.
13. The method of claim 11, wherein the material comprises a washing solution.
14. The method of claim 11, wherein the gap having a size from about 0.5 to about 5 mm.
15. The method of claim 11, wherein the step of rotating the photoresist material disposed on the substrate and the parallel plate concurrently comprising rotating the photoresist material layer and the parallel plate in the same direction at the same speed.
16. The method of claim 11, wherein the step of rotating the photoresist material disposed on the substrate and the parallel plate concurrently comprising rotating the photoresist material layer in a direction opposite the parallel plate.
17. The method of claim 11, further comprising a step of negatively charging the photoresist material layer prior to the step of providing an electric field between the gap.
18. A system for applying a developer material onto a photoresist material layer disposed on a substrate, the system comprising:

a developer plate having a generally planar surface that has a shape adapted to substantially surround the top surface of the photoresist material layer disposed on the substrate, the general planar surface having a plurality of apertures extending therethrough, the parallel plate being adapted to receive the developer material and apply the developer material onto the photoresist material layer through the plurality of apertures wherein the developer plate is positioned above the photoresist material layer during application of the material forming a gap therebetween;

a voltage source operable to provide a differential voltage, the voltage source having a first terminal coupled to the developer plate and a second terminal coupled to the substrate wherein a differential voltage is applied to the parallel plate and substrate providing an electric field in the gap; and

a developer supply system connected to the developer plate and a supply of developer material, the developer supply system being adapted to provide the developer plate with developer material.

19. The system of claim 18, wherein the developer supply system further comprising at least one developer supply nozzle coupled to the developer plate, the developer supply nozzle being adapted to supply the developer plate with the developer material.

20. The system of claim 18, wherein the generally planar further comprising a plurality of apertures extending therethrough for receiving a washing solution material and applying the washing solution material to the photoresist material layer.

21. The system of claim 20, further comprising at least one washing solution nozzle coupled to the developer plate, the washing solution nozzle being adapted to supply the developer plate with the washing solution material.

22. The system of claim 18, wherein the gap having a size from about 1 to about 3 mm.

23. The system of claim 18, further comprising a rotating shaft coupled to the developer plate, the rotating shaft being adapted to rotate the developer plate during application of the developer.

24. The system of claim 23, wherein the rotating shaft having a material supply tube extending therethrough, the material supply tube being coupled to the developer supply system and being adapted to supply the developer plate with the developer.

25. The system of claim 18, wherein the general planar surface having a generally circular shape with a circumference approximately equal to a circumference of the substrate.

26. The system of claim 18, the voltage source being further operable to negatively charge the photoresist material such that exposure to the electric field facilitates transport of developed portions of the photoresist material layer during a development process upon being exposed to the electric field in the gap.

27. A system for applying a material onto a photoresist material layer disposed on a substrate, the system comprising:

a developer plate having a plurality of apertures extending therethrough, the developer plate being adapted to receive developer material and supply developer material onto the photoresist material layer through the apertures;

means for providing an electric field between the developer plate and the photoresist material layer;

means for supplying a developer material to the developer plate; and

means for rotating at least one of the photoresist material layer and the developer plate during application of a developer material onto the photoresist material layer.

28. The system of claim 27, further comprising means for negatively charging the photoresist material layer.

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